

APPENDIX C

ONGOING MONITORING EFFORTS
WITHIN THE
EASTERN RIVERS AND MOUNTAINS NETWORK PARKS

(NOTE: PLEASE SEE THE WATER QUALITY SUMMARIES – APPENDIX G – FOR ADDITIONAL INFORMATION ON WATER QUALITY MONITORING SITES AND USGS FLOW GAGES)

➤ Allegheny Portage Railroad National Historic Site

1. **Project:** *Water quality monitoring on Blair Gap Run*
Agency: Alliance for Senior Involvement (PA Dept. of Environmental Protection)
Dates: 1996 -
Overview: Monitoring was initiated by a 1996 study through Penn State University at eight sites along Blair Gap Run. Park personnel took over the monitoring for 2 years and then 4 sites were chosen to be monitored by the Alliance for Senior Involvement. Basic water chemistry (pH, DO, specific conductance, nitrates, total phosphates, sulfates, alkalinity) is sampled monthly and macroinvertebrates are sampled twice annually. These data are currently (Fall 2004) being analyzed and incorporated into ALPO's Level 1 Water Quality assessment by an ERMN Cooperator.

2. **Project:** *Pennsylvania Atmospheric Deposition Network & Mercury Monitoring Network*
Agency: National Park Service, Penn State University, PA Department of Environmental Protection (with links to other agencies)
Dates: 1997 -
Overview: ALPO has Pennsylvania Atmospheric Deposition Monitoring Network atmospheric deposition and mercury deposition monitors on-site and operating since 1997. The Pennsylvania Atmospheric Deposition Monitoring Network monitors the same parameters, follows the same protocols and uses the same quality assurance programs as the National Atmospheric Deposition Network/National Trends Network and the Mercury Deposition Network (NADP/NTN and MDN). The purpose of the network is to collect data on the chemistry of precipitation for monitoring of geographic and temporal long-term trends. The precipitation at each station is collected weekly and then sent to the Central Analytical Laboratory where it is analyzed for hydrogen (acidity as pH), sulfate, nitrate, ammonium, chloride, and base cations (such as calcium, magnesium, potassium and sodium). The objective of the MDN is to develop a national database of weekly concentrations of total mercury in precipitation and the seasonal and annual flux of total mercury in wet deposition (analyzed by Frontier Geosciences).

3. **Project:** *Exotic plants (Summit Unit and Staple Bend Unit)*
Agency: National Park Service
Dates: 1999 -
Overview: Various *ad hoc* methods are used to monitor and control exotics. Japanese knotweed is spot treated and is mostly under control as of summer 2004. Honeysuckle, barberry and multiflora rose are monitored for reinfestations. Garlic mustard and teasel are hand pulled. This effort is conducted by Park personnel and volunteers as time allows.

➤ Johnstown Flood National Memorial

1. **Project:** *Exotic plant monitoring in the historic Conemaugh lakebed*
Agency: National Park Service
Dates: 1991 -
Overview: In 1988 and 1991, the historic lakebed of Conemaugh Lake was cleared of trees and brush as part of a viewshed management effort to give visitors a better visual view of the size of the lake that flooded the Little Conemaugh River and Johnstown in 1889. However, continual monitoring and control of exotic plants and woody vegetation must be done to manage invasive species from re-establishing the area as well as to prevent natural succession reverting the area back to a forested state.

➤ **Fort Necessity National Battlefield**

No current monitoring programs.

➤ **Friendship Hill National Historic Site**

No current monitoring programs.

➤ **Delaware Water Gap National Recreation Area**

1. **Project:** *Biocontrol of purple loosestrife*
Agency: National Park Service
Dates: 1999-
Overview: The primary goals of this program are to restore severely degraded sites and to reduce the rate of spread to new sites. Several species of leaf-eating, root-boring and flower-feeding beetles have been released at multiple sites within the park for control of purple loosestrife. These sites will be monitored annually for up to 5 years to determine effectiveness of loosestrife control.

2. **Project:** *Wintering and Nesting Bald Eagles*
Agency: Bureau of Land Management (Raptor Research and Technical Assistance Center)/New Jersey Department of Environmental Protection Division of Fish and Wildlife/New York State Department of Environmental Conservation/Pennsylvania Game Commission/National Park Service
Dates: 1978 (1986 for winter surveys within DEWA)-
Overview: Various monitoring efforts related to the Bald Eagle occur within the Delaware River Valley including: the National Mid-winter Eagle Survey which is a volunteer effort to cover all suitable and known wintering habitat (locally including DEWA and UPDE led in part by Allan Ambler of DEWA), then track the number of individual eagles observed on both days of the January survey using plumage characteristics and time observed; Aerial surveys are also done each year along the entire river to obtain winter population numbers; The Eagle Institute works cooperatively with the National Park Service and with New York State Department of Environmental Conservation to help visitors find and properly observe wintering eagles along the Upper Delaware River; Nesting eagles and young are monitored and young banded on their nest sites (NY only). PA Game Commission tracks nest locations and monitors some nests on the Pennsylvania side of the park. In general, an attempt is made to find and monitor all Bald Eagle nest sites from January through July.

3. **Project:** *Breeding Bird Survey*
Agency: USGS (Patuxent Wildlife Research Center)
Dates: 1966 – (for Kemah Lake Route)
Overview: The Breeding Bird Survey (BBS) is a cooperative, international effort to monitor the status and trends of North American bird populations. Part of one BBS route (Kemah Lake in NJ) is located in the park and has been surveyed annually since 1966. Each year during the height of the avian breeding season, June for most of the U.S. and Canada, participants skilled in avian identification collect bird population data along roadside survey routes. Each survey route is 24.5 miles long with stops at 0.5-mile intervals. At each stop, a 3-minute point count is conducted. During the count, every bird seen within a 0.25-mile radius or heard is recorded. Surveys start one-half hour before local sunrise and take about 5 hours to complete.

4. **Project:** *Christmas Bird Count*
Agency: National Audubon Society
Dates: 1993- (for Dingman's Ferry circle)
Overview: The Dingman's Ferry "circle" which includes part of DEWA has been conducted since 1993. The National Audubon Society Christmas Bird Count (CBC) is an early-winter survey of birds. The sample area for a count is a circle that is 15 miles in diameter, and varying numbers of volunteers count all birds they see in the circle during a single day (within 2 weeks of 25 December).

5. **Project:** *Hemlock tree health and Hemlock woolly adelgid (*Adelges tsugae*)*
Agency: National Park Service; US Forest Service; and other cooperators
Dates: 1995 –
Overview: The objective of this program is to monitor Hemlock woolly adelgid (HWA) infestation levels and to monitor new branch growth on Hemlocks. Monitoring occurs on 81 plots at 7 sites around the park. Percent of hemlock twigs producing new growth and the percent of twigs infested with the adelgid are recorded. In addition, since 1993, US Forest Service staff have evaluated individually marked hemlock trees within these permanent plots to assess hemlock health using visual crown health rating methods.

6. **Project:** *Air Quality – National Atmospheric Deposition Network & Mercury Deposition Network*
Agency: Site sponsored by the US Forest Service; Part of National inter-Agency Program
Dates: 1983 - (Mercury monitoring since 2000)
Overview: Milford, Pennsylvania immediately adjacent to DEWA has had a National Atmospheric Deposition Program/National Trends Network site (PA72) since 1983. The NADP/NTN collects data on the chemistry of precipitation for monitoring of geographic and temporal long-term trends. The precipitation at each station is collected weekly and then sent to the Central Analytical Laboratory where it is analyzed for hydrogen (acidity as pH), sulfate, nitrate, ammonium, chloride, and base cations (such as calcium, magnesium, potassium and sodium). The objective of the Mercury Deposition Network is to develop a national database of weekly concentrations of total mercury in precipitation and the seasonal and annual flux of total mercury in wet deposition (analyzed by Frontier Geosciences).

7. **Project:** *Water quality monitoring on the Delaware River mainstem*
Agency: Delaware River Basin Commission and National Park Service
Dates: 1984-
Overview: Since 1984, the Delaware River Basin Commission (DRBC) and National Park Service (NPS) have cooperatively conducted the "Scenic Rivers Water Quality Monitoring Program" (SRMP) in the upper 121.2 miles of the Delaware River. This section of river includes the Middle Delaware National Scenic and Recreational River (MDSRR) and the Upper Delaware National Scenic and Recreational River (UDSRR). In December 1992, the DRBC, with support from the NPS, adopted "Special Protection Waters" regulations intended to prevent degradation of this section of the Delaware River. Numeric water quality standards for 16 parameters for the MDSRR and 14 parameters for the UDSRR were specified as part of these regulations. Since 1984, the parameters measured and methods used have changed periodically. Seven mainstem sites are currently monitored bi-weekly from May through September on the Middle Delaware National Scenic and Recreational River. Seven parameters are currently monitored at each site (DO, specific conductance, pH, turbidity, fecal coliform, water temp, and air temp).

8. **Project:** *Water quality monitoring on the Delaware tributaries*
Agency: USGS and National Park Service
Dates: 2001-2005
Overview: In December 1992, the Delaware River Basic Commission (DRBC), with support from the NPS, adopted "Special Protection Waters" regulations intended to prevent degradation of this section of the Delaware River and its tributaries. One of the objectives of this tributary study is to define existing conditions for development of regulatory criteria for tributary Boundary Control

points as defined in the Special Protection Waters regulations. Fourteen tributaries are monitored on a biweekly basis from May through September with additional site visits conducted in early spring and late fall. Each site visit measures the basic field parameters of conductivity, dissolved oxygen, pH, air and water temperature, discharge, and turbidity, and samples are also collected and analyzed for specific nutrients and ions potentially indicating contamination by septic fields. Each site is also visited at least once during the summer during, or soon after, a storm event to collect runoff samples.

9. **Project:** *Water Quality*
Agency: Pike County Conservation District
Dates: 1987 -
Overview: The Pike County Conservation District Water Quality Monitoring Program was initiated in 1987 (and expanded in 1991) to evaluate surface water quality in rapidly growing Pike County. They sampled a variety of parameters at 120 random sites from 1987 until 1990. They now sample physical, biological, and chemical parameters from June through October on 18 baseline sites at the mouth of each watershed, 17 nonpoint source sites, and 17 sewage treatment plant discharge stream sites. They also conduct fish and macroinvertebrate studies on baseline and nonpoint sites. Many of these sites/watersheds are tributaries to the Delaware River that flow through Park property and/or contribute to mainstem water quality.
10. **Project:** *Water Quality-National Water Quality Assessment Program*
Agency: USGS
Dates: 1997 for the Delaware River Basin (DELR) NAWQA Study Unit
Overview: The goals of the NAWQA program are to (1) describe current water-quality conditions for a large part of the Nation's freshwater streams and aquifers (water-bearing sediments and rocks), (2) describe how water quality is changing over time, and (3) increase our understanding of the natural and human factors that affect water quality. The NAWQA program collects samples of water, suspended and bed sediment, biologic tissues, and aquatic communities at several sites throughout the Basin, some of which are located within the boundary of DEWA.

➤ Upper Delaware Scenic and Recreational River

1. **Project:** *Timber Rattlesnake Den Sites*
Agency: NY Department of Environmental Conservation
Dates: 1991-
Overview: The park has been thoroughly surveyed for den sites and these sites are monitored periodically (every few years).
2. **Project:** *Water Quality*
Agency: Delaware River Basin Commission and National Park Service
Dates: 1984 -
Overview: Since 1984, the Delaware River Basin Commission (DRBC) and National Park Service (NPS) have cooperatively conducted the "Scenic Rivers Water Quality Monitoring Program" (SRMP) in the upper 121.2 miles of the Delaware River. This section of river includes the Middle Delaware National Scenic and Recreational River (MDSRR) and the Upper Delaware National Scenic and Recreational River (UDSRR). In December 1992, the DRBC, with support from the NPS, adopted "Special Protection Waters" regulations intended to prevent degradation of this section of the Delaware River. Numeric water quality standards for 16 parameters for the MDSRR and 14 parameters for the UDSRR were specified as part of these regulations. Since 1984, the parameters measured and methods used have changed periodically. Ten mainstem sites and 15 tributary sites are currently monitored by DRBC monthly from April through November on the Upper Delaware National Scenic and Recreational River.

3. **Project:** *Wintering and Nesting Bald Eagles*
Agency: Bureau of Land Management (Raptor Research and Technical Assistance Center)/New Jersey Department of Environmental Protection Division of Fish and Wildlife/New York State Department of Environmental Conservation/Pennsylvania Game Commission/National Park Service
Dates: 1978 (1986 for winter surveys within DEWA)-
Overview: Various monitoring efforts related to the Bald Eagle occur within the Delaware River Valley including: the National Mid-winter Eagle Survey which is a volunteer effort to cover all suitable and known wintering habitat (locally including DEWA and UPDE led in part by Allan Ambler of DEWA), then track the number of individual eagles observed on both days of the January survey using plumage characteristics and time observed; Aerial surveys are also done each year along the entire river to obtain winter population numbers; The Eagle Institute works cooperatively with the National Park Service and with New York State Department of Environmental Conservation to help visitors find and properly observe wintering eagles along the Upper Delaware River; Nesting eagles and young are monitored and young banded on their nest sites (NY only). PA Game Commission tracks nest locations and monitors some nests on the Pennsylvania side of the park. In general, an attempt is made to find and monitor all Bald Eagle nest sites from January through July.
4. **Project:** *Zebra Mussels*
Agency: PA Department of Environmental Protection
Dates: 1992 -
Overview: Pennsylvania's Zebra Mussel (ZM) Monitoring Network has monitoring records for about 50 of the state's 67 counties. Presence/absence (primary means of quantification) results reported annually. Park service personnel survey locations each year to determine if zebra mussels have become established in the park (none have as yet) and report results to PA DEP.
5. **Project:** *Water Quality*
Agency: Pike County Conservation District
Dates: 1987 -
Overview: The Pike County Conservation District Water Quality Monitoring Program was initiated in 1987 (and expanded in 1991) to evaluate surface water quality in rapidly growing Pike County. They sampled a variety of parameters at 120 random sites from 1987 until 1990. They now sample physical, biological, and chemical parameters from June through October on 18 baseline sites at the mouth of each watershed, 17 nonpoint source sites, and 17 sewage treatment plant discharge stream sites. They also conduct fish and macroinvertebrate studies on baseline and nonpoint sites. Many of these sites/watersheds are tributaries to the Delaware River that flow through Park property and/or contribute to mainstem water quality.
6. **Project:** *Wood Turtle Mark/Recapture Study*
Agency: Bill Mitchell, Clarkson University
Dates: 1994 -
Overview: The objective of this study was to determine population size and breeding status of an averaged-sized population of wood turtles. The population resides in a small area on one of the tributaries of the Delaware River that leads into the park.
7. **Project:** *Aquatic invasive plants*
Agency: National Park Service Staff
Dates:
Overview: Various *ad hoc* methods are used to monitor and control exotics. Aquatic invasive species such as water milfoil and curly pondweed are monitored on a periodic basis by park personnel.

➤ New River Gorge National River

1. **Project:** *Ozone Passive Sampler Monitoring Network*
Agency: National Park Service
Dates: 1995 -
Overview: Provides a low-cost alternative to continuous ozone monitoring, but can provide information on trends in ozone levels. The measurements can tell if ozone exposures are high enough to present a risk to plant and animal resources.

2. **Project:** *Long-term Monitoring of New River Biota - LTEMs*
Agency: National Park Service
Dates: 1991 -
Overview: This program was designed to determine the effects of *Bacillus thuringiensis israelensis* (Bti) application on, and to provide a long-term monitoring program for, New River biota. Spraying for black flies on the New River with *Bacillus thuringiensis israelensis* began in 1986. The Park began what has become known as LTEMs (Long-term Ecological Monitoring System) monitoring in 1991. The program includes collection of basic water quality, benthic macroinvertebrates, fish, seston, and periphyton data. Sampling usually occurs during the first two weeks of August each year and includes four sampling sites on the New River (historically included five). A more intensive study of several fish species and dominant invertebrate taxa were assessed during an additional three year study (1988-1990).

3. **Project:** *Water Quality Monitoring Program*
Agency: National Park Service since 1990 (other agencies have historically been involved)
Dates: 1980 for NERI; 1991 for BLUE and GARI-
Overview: Program focuses on fecal coliform bacteria as well as other, basic field parameters (air and water temperatures, pH, specific conductance, turbidity and dissolved oxygen). Sampling occurs periodically on five sites within BLUE (3 mainstem; 2 tributaries), twenty four sites within NERI (7 mainstem; 2 at springs; 15 on tributaries), and five sites within GARI (3 mainstem; 2 tributaries). Sampling generally occurs between April and September for NERI and BLUE and continues into October for GARI (coinciding with periods of greatest human recreation on the rivers). Metals and alkalinity are sampled at these sites quarterly. A Hydrolab Datasonde installed in the New River at Thurmond monitors pH, DO, conductivity and water temperature every hour between April and October.

4. **Project:** *Monitoring Avian Productivity and Survivorship*
Agency: Institute for Bird Populations; Operated locally by Dr. Ron Canterbury and Park Staff
Dates: 1996 -
Overview: Banding site is located at Sandstone Falls in the riparian zone. The Monitoring Avian Productivity and Survivorship (MAPS) Program was created by The Institute for Bird Populations in 1989 to assess and monitor the vital rates and population dynamics of over 120 species of North American landbirds in order to provide critical conservation and management information on their populations. The MAPS Program utilizes constant-effort mist netting and banding at a continent-wide network of monitoring stations staffed by both professional biologists and highly trained volunteers. Birds are banded during on a 10-day interval for a 10-week period during the summer.

5. **Project:** *Fall bird banding at Sandstone Falls*
Agency: Operated by Dr. Ron Canterbury and Park Staff
Dates: 1995 -
Overview: These fall migration bird-banding stations (tennets) at Sandstone Falls are typically operated for five days each fall.

6. **Project:** *Peregrine Falcon Monitoring*
Agency: National Park Service
Dates: 2002 -

Overview: The objectives of this program are to determine whether peregrine falcons are breeding or attempting to breed on or near the Endless Wall from Beauty Mountain to the bridge area in New River Gorge National Scenic River and, further, to locate and monitor peregrine falcon eyries in the area. The monitoring period runs from mid- February to late- April if no breeding peregrine falcons are observed. If breeding peregrine falcons are located, mid- February to two weeks after the young fledge (or death of the eggs or chicks is confirmed).

7. **Project:** *Avian Point Counts*
Agency: National Park Service, WV DNR, WV Partners in Flight
Dates: 1995 -
Overview: This project uses standard point counts along two transects (methods developed by WV DNR NHP and PIF) to monitor the avian community in two deciduous forest stands (Brooklyn and Glade Creek). 20 points spaced 250m apart 5min point count at each. The Park contracts ornithologists to conduct surveys.
8. **Project:** *Allegheny Woodrat*
Agency: Petra Wood, WVU (with park staff)
Dates: 1998 -
Overview: six transects monitored long-term (GARI and NEW; 3 each). Objective is to gather baseline information on the population size, extent, and habitat characteristics in the New River Gorge NR. In addition, small tissue samples were collected from individuals trapped in the NRGNR to be used in a larger study of metapopulation dynamics throughout the state.
9. **Project:** *Hemlock Ecosystem Inventory and Monitoring Program*
Agency: John Wood, consultant; Petra Wood USGS, avian surveys; Park Staff
Dates: 1998 -
Overview: The objective of this program was to establish permanent vegetation sampling plots within and around the New River Gorge National River and Gauley River National Recreation Area for long-term monitoring of hemlock wooly adelgid (*Adelges tsugae*;HWA).Thirty-six permanent 400m² plots were established during October, 1998 and baseline measurements of the overstory, sapling, shrub, and understory vegetation layers within each sampling plot, including data on degree of HWA infestation and hemlock crown vigor were collected. No evidence of HWA was observed during the initial (1998) permanent plot establishment. Songbird surveys are also completed on each of these 36 plots each summer (avian breeding season).

➤ Gauley River National Recreation Area

1. **Project:** *Avian Point Counts*
Agency: National Park Service, WV DNR, WV Partners in Flight
Dates: 1995 -
Overview: This project uses standard point counts along one transects (methods developed by WV DNR NHP and PIF) to monitor the avian community in deciduous forest stands (Meadow River Site). 20 points spaced 250m apart 5min point count at each. The Park contracts ornithologists to conduct surveys.
2. **Project:** *Allegheny Woodrat*
Agency: Petra Wood, WVU (with park staff)
Dates: 1998 -
Overview: Throughout NRGNR, rocky habitats were searched for evidence and condition of woodrat sign, such as latrine areas or middens. Sites with evidence of woodrats as well as sites with no evidence of woodrats but that exhibited suitable rock size and structure were trapped. Vegetation structure and composition was measured on at least one 0.04 ha circular plot at each

occupied site. A study was also conducted examining gene flow among woodrat populations throughout West Virginia and adjacent states using microsatellite DNA analyses. A small tissue sample was collected from each woodrat trapped on NRGNR and was included in DNA analyses for this larger study. NERI Park Personnel are currently trapping and monitoring woodrats at six of the previously inventoried sites.

3. **Project:** *Hemlock Ecosystem Inventory and Monitoring Program*
Agency: John Wood, consultant; Petra Wood USGS, avian surveys; Park Staff
Dates: 1998 -
Overview: The objective of this program was to establish permanent vegetation sampling plots within and around the New River Gorge National River and Gauley River National Recreation Area for long-term monitoring of hemlock wooly adelgid (*Adelges tsugae*;HWA).Thirty-six permanent 400m2 plots were established during October, 1998 and baseline measurements of the overstory, sapling, shrub, and understory vegetation layers within each sampling plot, including data on degree of HWA infestation and hemlock crown vigor were collected. No evidence of HWA was observed during the initial (1998) permanent plot establishment. Songbird surveys are also completed on each of these 36 plots each summer (avian breeding season).

4. **Project:** *Virginia spiraea*
Agency: WV DNR NHP
Dates: 1980s -
Overview: The West Virginia DNR has been monitoring populations of Virginia spiraea along the Gauley and Meadow Rivers with the objective of detecting changes in population size and health.

5. **Project:** *Water Quality Monitoring Program*
Agency: National Park Service since 1990 (other agencies have historically been involved)
Dates: 1980 for NERI; 1991 for BLUE and GARI-
Overview: Program focuses on fecal coliform bacteria as well as other, basic field parameters (air and water temperatures, pH, specific conductance, turbidity and dissolved oxygen). Sampling occurs periodically on five sites within BLUE (3 mainstem; 2 tributaries), twenty four sites within NERI (7 mainstem; 2 at springs; 15 on tributaries), and five sites within GARI (3 mainstem; 2 tributaries). Sampling generally occurs between April and September for NERI and BLUE and continues into October for GARI (coinciding with periods of greatest human recreation on the rivers). Metals and alkalinity are sampled at these sites quarterly.

➤ Bluestone National Scenic River

1. **Project:** *Avian Point Counts*
Agency: National Park Service, WV DNR, Partners in Flight
Dates: 1995 -
Overview: This project uses standard point counts along one transects (methods developed by WV DNR NHP and PIF) to monitor the avian community in deciduous forest stands (Bluestone River Lodge Site). 20 points spaced 250m apart 5min point count at each. The Park contracts ornithologists to conduct surveys.

2. **Project:** *Virginia spiraea*
Agency: WV DNR NHP
Dates: 1980s -
Overview: The West Virginia DNR has been monitoring populations of Virginia spiraea along the Bluestone River with the objective of detecting changes in population size and health.

3. **Project:** ***Water Quality Monitoring Program***
 Agency: National Park Service since 1990 (other agencies have historically been involved)
 Dates: 1980 for NERI; 1991 for BLUE and GARI-
 Overview: Program focuses on fecal coliform bacteria as well as other, basic field parameters (air and water temperatures, pH, specific conductance, turbidity and dissolved oxygen). Sampling occurs periodically on five sites within BLUE (3 mainstem; 2 tributaries), twenty four sites within NERI (7 mainstem; 2 at springs; 15 on tributaries), and five sites within GARI (3 mainstem; 2 tributaries). Sampling generally occurs between April and September for NERI and BLUE and continues into October for GARI (coinciding with periods of greatest human recreation on the rivers). Metals and alkalinity are sampled at these sites quarterly.